

April 15, 2011

Attn: Delta Stewardship Council via [deltaplancomment@deltacouncil.ca.gov](mailto:deltaplancomment@deltacouncil.ca.gov)  
Re: Second Staff Draft Delta Plan  
Recommendations to support watershed restoration for baseflow augmentation  
Attn: Delta Plan EIR & Data Collection: Central Valley groundwater overdrafts—updated information on from Famiglietti et al. (2011)

Dear Delta Stewardship Council,

I commend the Council for developing the Delta Plan in what appears to be an open and transparent process. I commend the staff for their fortitude in publishing incomplete draft plans subject to public, as well as Council and Independent Science Board critique and input. I also commend the public commenters for the high quality of input to date. My observation is that some public commenters have proposed statements of findings and policy that represent valuable contributions to the process, boding well for a successful outcome. While I acknowledge that providing sound input consumes valuable volunteer time, I encourage my fellow public commenters to provide scientific citations per Tables 2-1 and 3-1 for their proposed statements of findings, to facilitate their incorporation into the plan.

Since I do not have time to comment directly on all applicable chapters and text, I ask the Council to please observe that the alternative strategy I propose, watershed restoration for baseflow augmentation, as summarized in my January 28, 2011 NOP comments and attachments, including citations, directly or indirectly supports most of the objectives that the Legislature declares are inherent in the coequal goals for the management of the Delta, per the plan objectives, Chapter 1. The Delta Plan, page 1:

- (a) Baseflow augmentation through watershed restoration as proposed supports the “*water resources of the state over the long term*”, as well as supporting management of the Delta’s water and environmental resources.
- (b) Through accomplishment of the above and below objectives this proposal directly and indirectly supports objective b.
- (c) Baseflow augmentation through watershed restoration, as proposed, will directly support restoration of “*the Delta ecosystem, including its fisheries and wildlife, as the heart of a healthy estuary and wetland ecosystem*”.
- (d) Subsurface storage of precipitation as proposed is superior in supporting the objective of “*statewide water conservation . . . and sustainable water use*” to proposed surface storage strategies which subject enormous measures of stored water to losses through evaporation and whose structures are subject to inevitable sedimentation, rendering them less effective over time, in contrast with subsurface storage that will only improve over time to some as yet unknown optimum.
- (e) Subsurface storage and transmission of water through ecologically restored vadose zones, riparian and other wetlands and their associated aquifers (provided that they are protected from historic/ongoing pollution) is the most efficient means of improving “*water quality to protect human health and the environment consistent with achieving water quality objectives in the Delta*”.

- (f) By its very nature, subsurface detention storage in upland vadose zones, riparian and other wetlands throughout the Delta Plan Study Area, as proposed in the baseflow augmentation approach, will “*expand statewide water storage*”. The summary I developed for the National Research Council, attached as part of my NOP comments, does not divulge the extent of opportunities for watershed restoration for baseflow augmentation identified through my GIS analysis, which encompasses the coastal counties from the San Francisco Bay Area southward through San Diego County. In most of these counties there are ample opportunities to improve local storage capacity through strategic watershed restoration. Thus, in addition to the increased storage capacity I estimate at over 8 million acre-feet per year in the watersheds feeding the great Central Valley, there are opportunities to increase storage capacity throughout the study area using this approach. Furthermore, this approach will require a greatly reduced regulatory burden and infrastructure costs and thus can begin to be implemented much sooner than engineering strategies.
- (g) Expanding detention storage in the watersheds feeding the Delta, as proposed, directly reduces “*risks to people, property and state interests . . . in the Delta*” through “*appropriate land uses and investments in flood protection*”.

Page 1, lines 30-32: As noted in my comments on objective f, the watershed restoration for baseflow augmentation strategy I propose is applicable to watersheds throughout the greater Delta Plan Study Area (Figure 1-1).

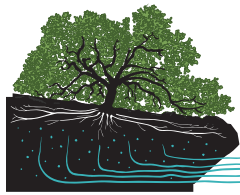
Since responsibilities over the past few months have delayed my attention to development of the website and ebooks that will make my findings publicly accessible, I will happily provide the current version of my dissertation in electronic form for review by the Council and Independent Science Board upon request. I trust that my dissertation meets the standards of scientific credibility described in Tables 2-1 and 3-1, given that I have drawn from well over 600 scientific sources, many from government-sponsored studies, spanning a century, as well as the globe; and that my draft dissertation was approved by an interdisciplinary doctoral committee of five PhDs in July 2008. Partly because of the novelty of my subject, along with the pace of academic bureaucracy, a subsequent draft is currently in the Dean's Review process. Thus, while my degree has not been finalized, the work has already undergone significant academic review. The Independent Science Board can serve the purpose of additional peer review, as necessary. It seems premature to propose statements of applicable findings and related policy until the Council and/or Independent Science Board have the entirety of my scientific support in hand. Furthermore, I currently lack the time necessary to apply my skills to writing proposed policy statements. However, please note the relevant policy implications of the attached message, simultaneously submitted to the EIR process.

I trust that the next draft plan may begin to incorporate language reflecting my proposed baseflow augmentation through watershed restoration strategy. Incorporation of language supporting this sustainable, integrative, ecohydrological, ecological economics approach into the plan need not preclude other approaches. But as the plan currently reads, it is biased toward unsustainable, reductionistic 20<sup>th</sup> century engineering approaches to water resources management and against holistic approaches that take advantage of heretofore overlooked significant opportunities to restore desirable functions of the subject watersheds we all depend on.

Respectfully,

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Attn: Delta Stewardship Council via [deltaplanscoping@deltacouncil.ca.gov](mailto:deltaplanscoping@deltacouncil.ca.gov)  
Cc: Delta Plan drafts via [deltaplancomment@deltacouncil.ca.gov](mailto:deltaplancomment@deltacouncil.ca.gov) as attachment to comments on  
Second Staff Draft Plan  
Re: Delta Plan EIR & Data Collection: Central Valley groundwater overdrafts—updated  
information on from Famiglietti et al. (2011)

Dear Delta Stewardship Council,

I wish to call your attention to updated information published online in February this year concerning Central Valley groundwater losses during the recent drought years (Famiglietti et al. 2011). The full citation follows, along with the url where the abstract is available.

Famiglietti, J. S., M. Lo, S. L. Ho, J. Bethune, K. J. Anderson, T. H. Syed, S. C. Swenson, C. R. de Linage, M. Rodell. 2011. Satellites measure recent rates of groundwater depletion in California's Central Valley. *Geophysical Research Letters* 38:L03403. doi: 10.1029/2010GL046442.

<http://europa.agu.org/?view=article&uri=/journals/gl/gl1103/2010GL046442/2010GL046442.xml&t=famiglietti>

Incorporation of this information into the Delta planning and CEQA evaluation processes seems critical to ensure that the plan leads to sustainable long-term results. It would seem that the only way to ensure long-term sustainability is to develop a water balance approach that accounts for annual variations in precipitation and provides “water in the bank” to be drawn on during the inevitable droughts.

Watershed restoration for baseflow augmentation, as proposed in my January 28, 2011 NOP comments, offers the most cost-effective and secure means of storing water over multiple-year droughts—it is, in fact, the way nature has always done it, but our cumulative human economic activities in ignorance of these relationships has impacted natural watershed functions.

Related to the baseflow augmentation approach, I wish to point out some key assumptions made by Famiglietti et al. (2011) in developing their data. As they observe, “Soil moisture content is largely unmeasured in the United States. Consequently we estimated soil moisture storage using the average of three different soil moisture simulations (Rodell et al. 2009)” (ibid.). Soil moisture is a highly complex and poorly understood issue and thus some estimate was necessary. The authors also make the assumption that “the mountain ranges surrounding the Valley have limited capacity to store groundwater” (ibid.). This assumption may ultimately prove false and merits further investigation, but as the authors acknowledge, “satellite gravimetry offers an important complement to both *in situ* observations and modeling studies” (ibid.) that, combined, should support adaptive management of the whole watershed systems of concern in the study area.

Respectfully,

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